

Title: Gingerbread Glyphs and Graphs

Brief Overview:

In this unit students will use gingerbread men to explore the concepts of data collection and analysis. This will be achieved through the construction of stem and leaf plots, glyphs, and pictographs.

Links to NCTM Standards:

- **Mathematics as Problem Solving**
Students will demonstrate their ability to solve problems in mathematics including problems with open-ended answers, problems which are solved in a cooperative atmosphere, and problems which are solved with the use of technology.
- **Mathematics as Communication**
Students will demonstrate their ability to communicate mathematically. They will read, write, and discuss mathematics with language and the signs, symbols, and terms of the discipline.
- **Mathematics as Reasoning**
Students will demonstrate their ability to reason mathematically. They will make conjectures, gather evidence, and build arguments.
- **Mathematical Connections**
Students will demonstrate their ability to connect mathematics topics with the discipline and with other disciplines.
- **Number Sense and Numeration**
Students will demonstrate their ability to describe and apply number relationships using concrete and abstract materials. They will choose appropriate operations and describe effects of operations on numbers.
- **Statistics**
Students will demonstrate their ability to collect, organize, and display data and will interpret information obtained from displays. They will write reports based on statistical information.
- **Patterns**
Students will demonstrate their ability to recognize numeric and geometric relationships and will generalize a relationship from data.

Grade/Level:

Primary (lower level 3rd grade)

Duration/Length:

4 class days (variable)

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Basic geometric shapes
- Pictograph
- Ordinal numbers
- Sequencing
- Place value

Objectives:

Students will:

- collect, record, and interpret data.
- measure time.
- follow simple picture directions.
- use cooperative problem solving skills.
- construct and compare 2 stem and leaf plots.
- construct and interpret a glyph with 4 variables.
- construct and interpret a pictograph.

Materials/Resources:

- Story titled, The Gingerbread Man by Karen Lee Schmidt, Scholastic
- Teacher Resource Sheets
- Student Resource Sheets
- Materials for Gingerbread Sugar Cookies (1 roll for 7 students)
- Access to Oven
- Ingredients to Decorate Cookies (M&M's, candy corn, white baking chips, string licorice, chocolate frosting - 1 can per group)
- Chart Paper
- Markers
- Smiley Stickers
- Construction Paper
- Scissors
- Glue

- Pencils
- Dot Stickers
- Classroom Clock with Second Hand

Development/Procedures:

Day 1:

- The teacher will read story The Gingerbread Man by Karen Lee Schmidt.
- Students will roll out cookie dough. Use pre-made sugar cookie dough. Have children cut gingerbread men shapes, two each. Bake as directed.

Day 2:

- Introduce first vignette (Teacher Resource #1).
- Hand out gingerbread man assembly instructions. (Student Resource #1).
- Have students look closely at pictures as teacher models assembly.
- Give time for students to plan assembly and ask questions.
- Working in pairs, students will take turns timing and assembling gingerbread men.
- Students will record times in seconds.
- Teacher will display time data in a class stem and leaf plot on a wall or bulletin board (using TR#2 for cut apart leaves). Keep display for future use.
- Tell students they will work in teams tomorrow to make gingerbread men faster.
- Teacher and students will eat gingerbread men.

Day 3:

- Teacher will read class vignette #2 (TR#3) to prepare for assembly line production.
- Class will discuss “assembly line”. Teacher guides discussion to elicit appropriate applications.
- Student groups brainstorm ways to make their gingerbread men quickly.
- Students should select a timer / quality control manager to collect and record times on worksheet (SR#2), as well as inspect the quality of the work. This student will also encourage other students to work quickly.
- Students begin work, and construct enough gingerbread men for each person in their group. Make sure construction of each cookie is timed individually, not as a group.

- Using the data collected, complete a 2nd stem and leaf plot. Compare the assembly line data with the data from yesterday. Discuss how the two sets of data are the same or different. Why?
- Instruct students to eat gingerbread men like the fox did in the story, but they may take only one bite.
- After each student takes one bite, survey and tally which body part was eaten.
- Have students create a bar graph to display data (SR#3).
- Teacher collects and evaluates the graphs as per rubric (TR#4)

Day 4:

- Teacher explains glyphs as a very special way to display data (See TR#5 for explanation). Show completed teacher glyph. Explain that this gingerbread man tells things about your teacher. Tell students they will make a gingerbread glyph to describe them.
- Teacher reviews glyph legend (SR#4).
- Discuss teacher's glyph and what it tells.
- Hand out art supplies, and have students construct personal glyph. (SR#5&6). SR#6 gets cut apart for 3 students to use.
- In pairs, students will interpret their partner's glyph.
- Teacher collects, evaluates as per rubric and displays appropriately with glyph legend. (i.e. bulletin board, hall display).

Performance Assessment:

Assessment of student progress is ongoing throughout this unit. The scoring rubrics (TR# 4 and 6) may be used to evaluate the students on graphing and glyph skills. Teacher observations and questioning are vital in assessing the progress in stem and leaf plotting, as this is a new skill to most third graders.

Extension/Follow Up:

- Teacher will read related story, The Gingerbread Boy by Scott Cook and Alfred A. Knopf. Compare and contrast the two stories.
- Students act out the story of The Gingerbread Man.
- Students design and conduct an investigation to discover if gingerbread men sink or float.
- Students write a new ending for The Gingerbread Man so he will not be eaten.
- Students draw a Gingerbread Man Mural depicting the story.
- Students create a map of the Gingerbread Man's Farm.
- Retell The Gingerbread Man as a class and create a big book to share with a kindergarten or first grade class. Or, retell as a small booklet to keep.

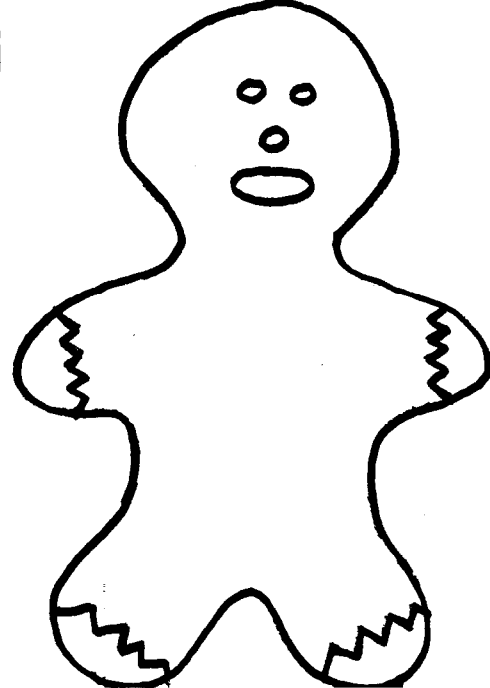
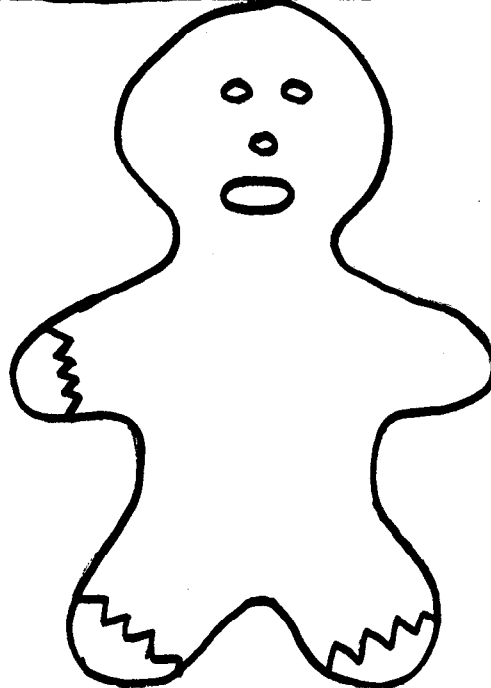
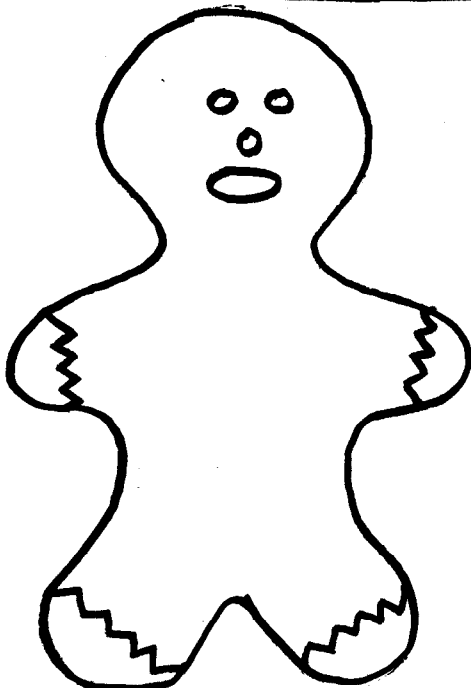
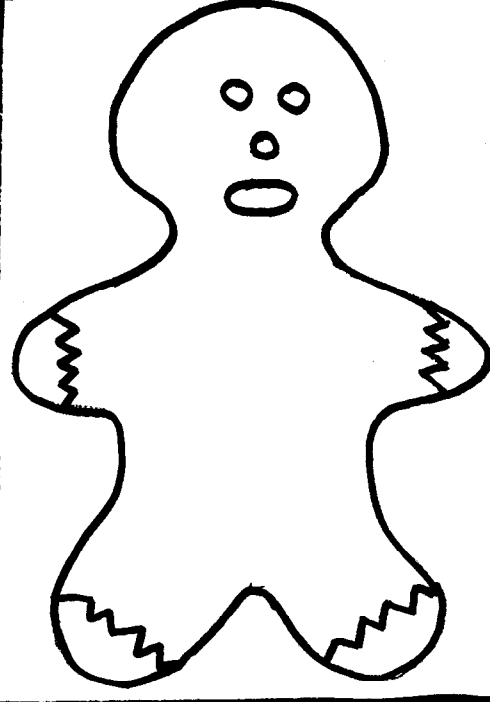
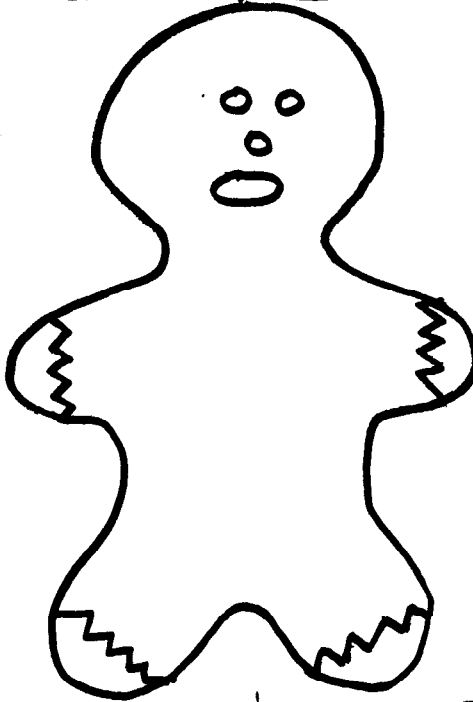
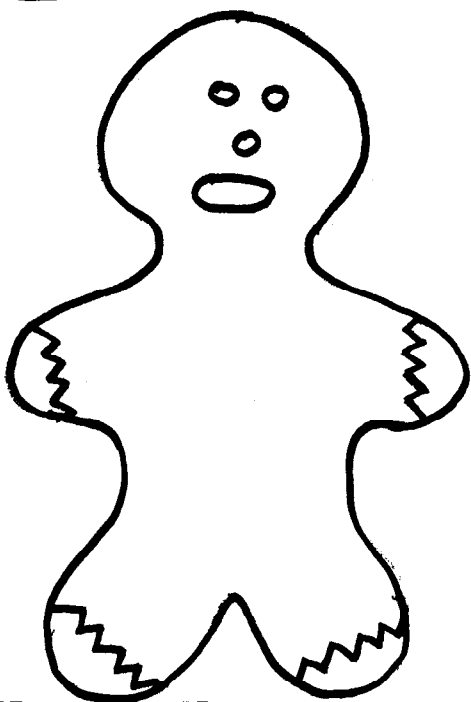
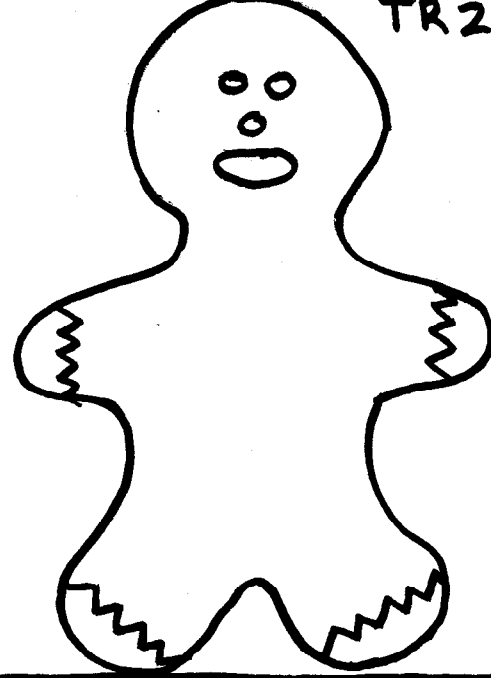
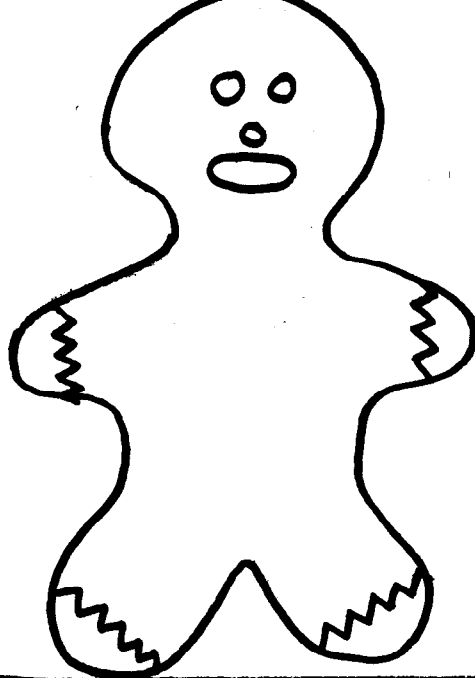
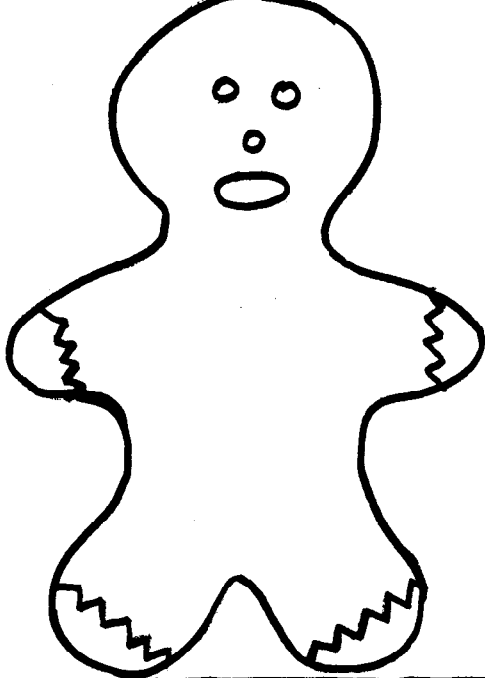
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Vignette #1

Mr. and Mrs. Farmer are so sad and lonely without their little Gingerbread Man, Bob! They want you to make them a new one that looks just like Bob. It is very important that you follow Mrs. Farmer's directions exactly so yours looks like Bob.



Vignette #2

The Fox thought the gingerbread boy tasted delicious! He wanted all of his friends to try one, too. He thought about making them to sell at the Fox Food Store. But if he made them one at a time, he'd never make enough for everyone. He thought and thought and then he had an idea. He'd hire _____'s _____ grade class to make them for him at Mr. Fox's Food Factory.

Scoring Rubric for Bar Graph

- 3 Student has 3 pieces of data displayed correctly with equal intervals and spaces between the bars.
- 2 Student has 2 or 3 pieces of data with unequal intervals or no spaces between the bars.
- 1 Student has 1 or 2 pieces of data with unequal intervals and no spaces between the bars.
- 0 Data, if displayed, is inaccurate, poorly spaced with incorrect intervals.

So . . . What Is A Glyph?

Any picture that represents data with several variables can be called a “glyph”. Glyph is short for hieroglyphics, the ancient Egyptian form of written language. The symbols of a glyph should contain elements relative to the final picture.

Examples:

- eyes on a snowman could represent student eye color
- buttons on coat could represent student age
- hands up or down could represent right or left handedness.

Glyph Scoring Rubric

- 4 Gingerbread components accurately depict child's data on all 4 points.
- 3 Completed gingerbread components accurately depict 3 pieces of data.
- 2 Completed gingerbread components accurately depict 2 pieces of data.
- 1 Completed gingerbread components accurately depict piece of data.
- 0 Completed gingerbread components depict no data accurately,
- or -
Gingerbread components not completed at all.

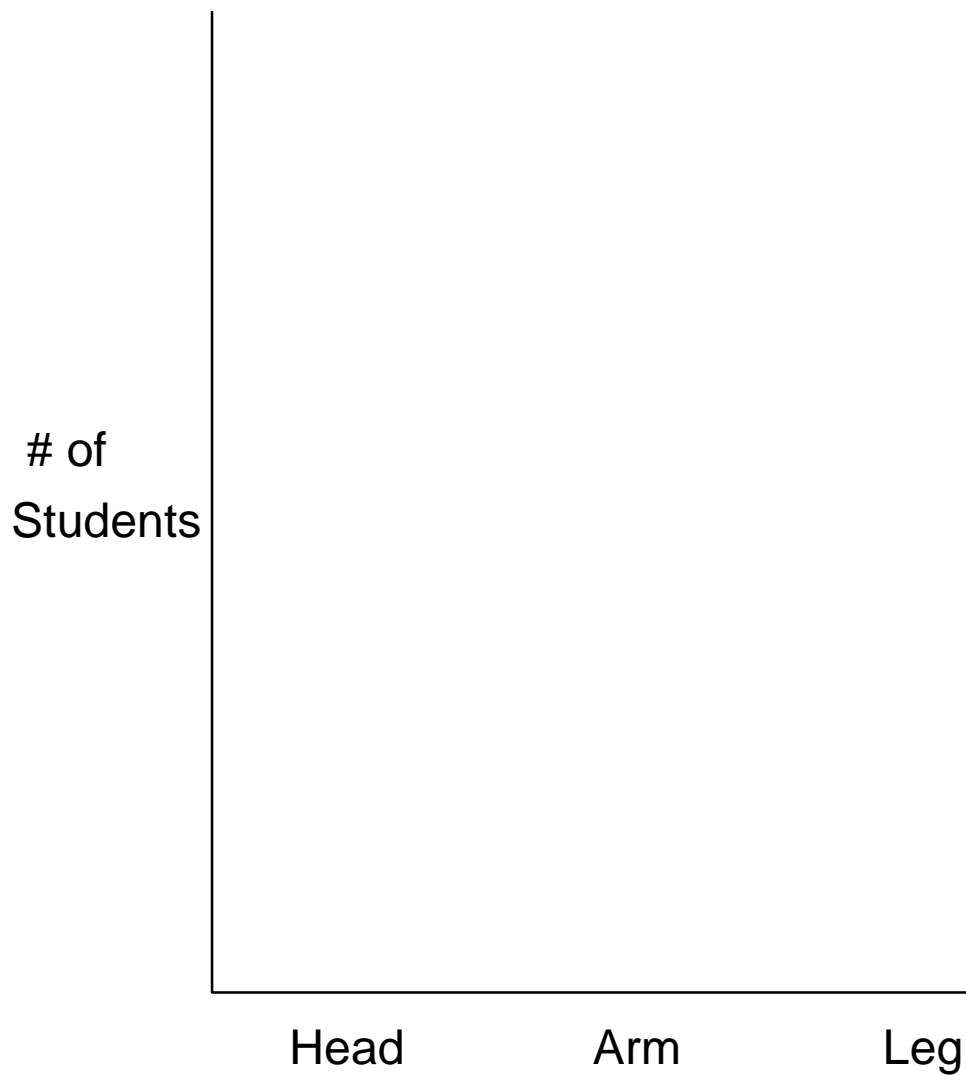
Mrs. Farmer's Gingerbread Making Instructions

1. Frost Gingerbread man completely with icing.
2. Place 2 M&M candies for eyes.
3. Place 1 candy corn for nose.
4. Place 3 white baking chips for buttons.
5. Place licorice string for hand and foot lines.

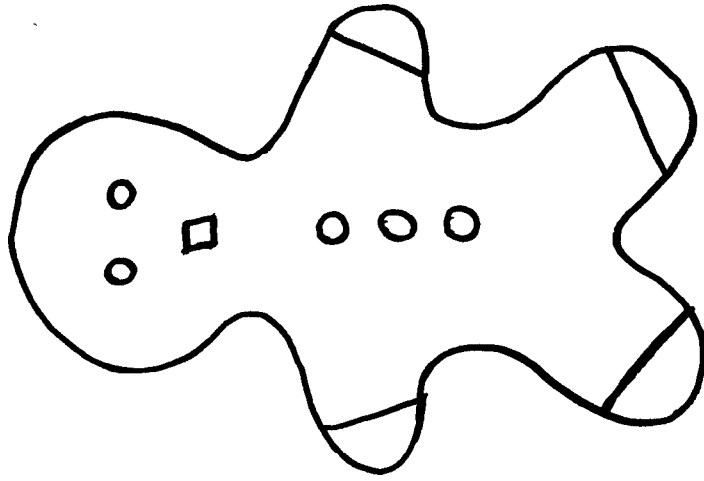
Assembly Line Data Chart

Gingerbread #	Time in Seconds
1	
2	
3	
4	
5	
6	

Which Part Gets Eaten First?



Legend



Eyes

Blue

I like to read the most.

Brown

I like to watch TV the most.

Green

I like to play computer games the most.

Button



I am a girl.



I am a boy.

Mouth



I am seven years old.



I am eight years old.

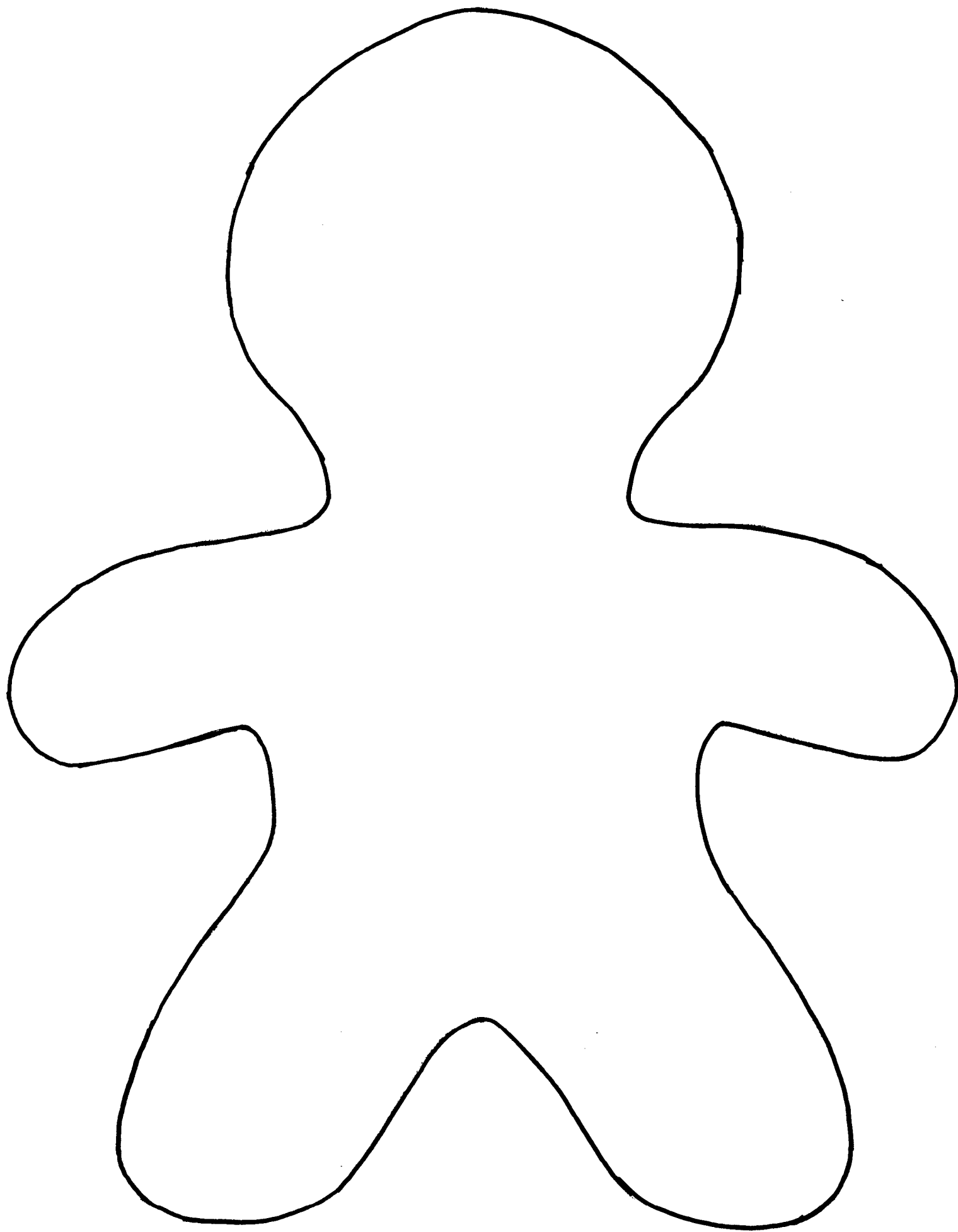




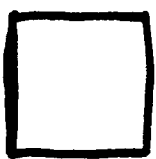
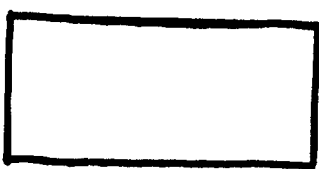
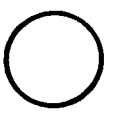
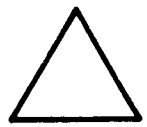
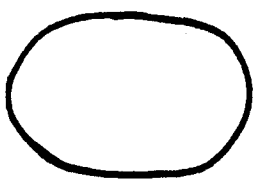
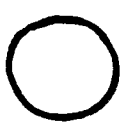

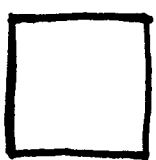

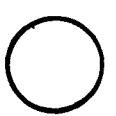

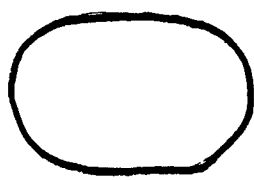
I am nine years old.

Hand/Foot Lines

 I am right-handed.

 I am left-handed.



Button	Button	Mouth	
			
			
Button	Button	Mouth	
			
			
Button	Button	Mouth	
